SCIENCE SPAZA SPACE

Knowledge is Ncah!

MEERKAT EDITION – OCTOBER 2018

Meet the MeerKAT

Jive Media Africa

NRF National Research Foundation | SARAO South African Radio Astronomy Observatory

Science Spaza is an initiative of research communication specialists Jive Media Africa in partnership with the Yazi Centre for Science and Society in Africa, a registered Non-Profit Company and Public Benefit Organisation.

YAZI CENTRE FOR SCIENCE & SOCIETY IN AFRICA

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***Spaza Space* is the official publication of the Science Spaza programme, which is an initiative of research communication specialists, Jive Media Africa.**

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We are talking to our future leaders. Are you?

Travel to the stars with Science Spaza

We are so excited about the stars, and what they can teach us! That is why the South African **MeerKAT radio telescope array** is so important! (Do you know what the word means? Find the answer on page 1 of the SARAO insert!)

The huge MeerKAT radio telescope array – actually a whole group of radio telescope dishes or receivers – is located in the Northern Cape Province of South Africa. We are using this issue of the *Spaza Space* newspaper to show off this new South African telescope and be proud of what our fellow South Africans are achieving! In the end it will become part of something even bigger, namely the huge **Square Kilometre Array or SKA**. This shows just how important our country has become in terms of this research.

Throughout this edition we hope to provide you with more information about the MeerKAT radio telescope, as well as the people who were involved in the creation of it. Be inspired by the interviews with scientists and learn more about telescopes.

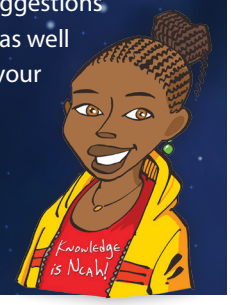
On page 2, read about the fascinating **lunar eclipse** that South Africa experienced in July. On page 6, you will find more information about the **Karoo** and learn about some **new species** that were recently discovered in this area.

On page 7, find out about the interesting event that we hosted at Edendale Technical High School for National Science Week. On page 8, we report about what **science clubs** are getting up to and how they are enjoying this newspaper.

Find out about **Minquiz** and enter the competition on page 3 and stand a chance to win some awesome prizes!

We hope you enjoy reading this edition of *Spaza Space*. Remember to send us your suggestions for future articles, as well as the news from your club.

The Science Spaza Team



Into the Shadow of Earth… a Total Lunar Eclipse

On the night of 27 July 2018, the world experienced the longest lunar eclipse of this Century. It lasted almost four hours in total, and the phase during which the moon was completely masked by the shadow of Earth, lasted a full hour and 43 minutes. South Africa was lucky enough to be one of the countries to have a full view of this amazing event, because we were on the "right" side of Earth at the time.

Views of the Moon as it slowly gets darker and the colour changes to dark red during a total eclipse. *Wikicommons - By Kahlil Garcia, CC BY-SA 4.0*

A lunar eclipse happens when the orbits of the moon around Earth, as well as Earth around the sun, are such that Earth moves directly between the sun and the moon. This means the moon appears to move into the shadow of Earth. As the eclipse begins, Earth's shadow first darkens the moon slightly. Then it begins to cover part of the moon, and finally the moon turns a dark red-brown colour during the total phase. Because of this colour change, a lunar eclipse is sometimes called a "blood moon".

The dark red has nothing to do with evil, as some people say. The colour changes because when the moon is in Earth's shadow, a little bit of the sunlight shining on Earth is bent around the edges of Earth by Earth's atmosphere. The atmosphere scatters (or "throws away") more of the shorter-wavelength light in colours such as green or blue. The longer-wavelength colours such as red then still appear to shine on the moon.

Did you know? Bright Mars

The night of the July eclipse also happened at a time when Mars was at its brightest as seen from Earth. Both planets orbit the sun, but at different distances and speeds. On 31 July, Earth and Mars were at such stages of their orbits that our planet was "passing between" the sun and Mars and the two planets were relatively close to one another – but still almost 57 million kilometres apart!

This close stage is called opposition. It happens every two years or so, but was special this time because Mars could be seen so brightly at the same time as the lunar eclipse.

VOCABULARY

Orbits – the path of a planet around a star, or a moon around its planet.

MINQUIZ

"Are you our next Science Whizz?"

So, what is Minquiz™ ?

Minquiz™ is South Africa's Premier National Science Competition.

Minquiz™ combines the rigors of an Olympiad with the excitement of a live on-stage quiz to produce an entertaining competition for Grade 12 learners that promotes excellence in Physical Science and Mathematics.

PROVINCIAL COMPETITION
16 May 2019

NATIONAL COMPETITION
3 & 4 July 2019
(For provincial winners only)

For partnership (sponsorship) and all other queries, contact Dominic.
E-mail: **minquiz@mintek.co.za** or call **(011) 709 4139**

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- Chemical Engineering (Minerals Processing or Process Control);
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- Extractive Metallurgy (Pyrometallurgy, Hydrometallurgy or Biohydrometallurgy);
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- Mechanical Engineering;
- Minerals Processing;
- Mechatronics Engineering;
- Mining-Focused Environmental Compliance

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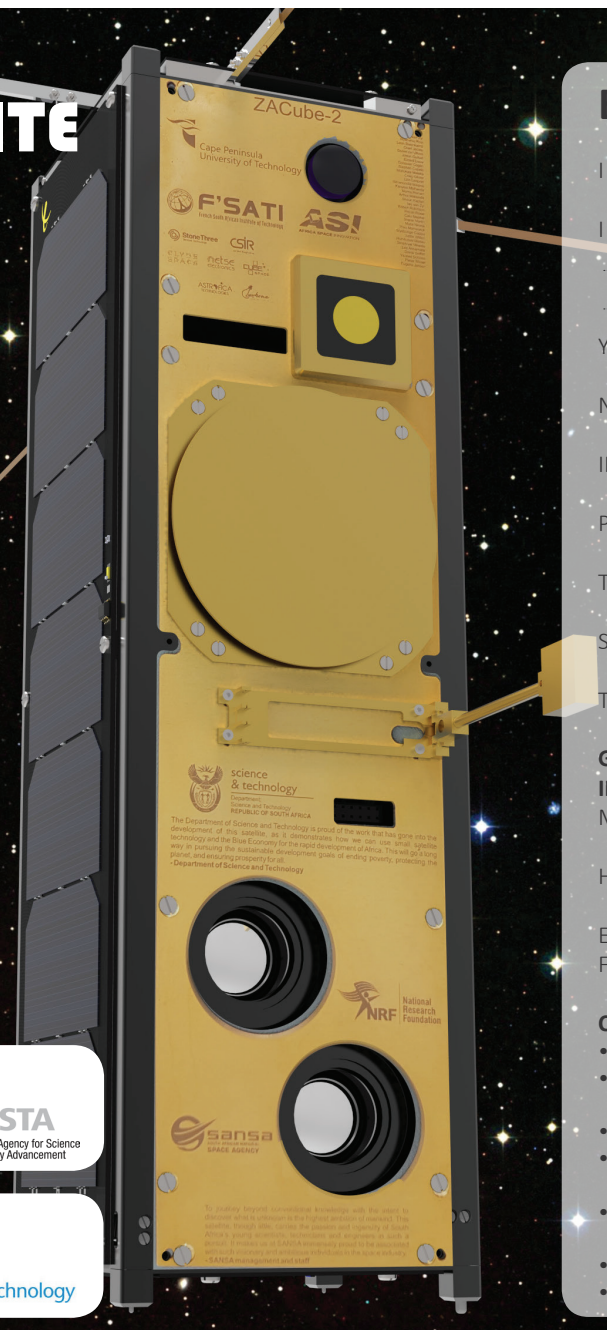
NAME THE SATELLITE COMPETITION

learners in grades 4 – 12 are invited to

NAME SOUTH AFRICA'S NANO SATELLITE ZACUBE-2

YOU CAN WIN

- A laptop.
- A tour to selected Space Engineering facilities in the Western Cape for a learner and one adult supervisor.
- A 3D Printed Satellite for the School.



ENTRY FORM

I SUGGEST THE FOLLOWING NAME: .....

I BELIEVE THIS NAME IS APPROPRIATE BECAUSE: .....

.....

.....

YOUR NAME AND SURNAME: .....

NAME OF SCHOOL AND PROVINCE: .....

IN WHICH GRADE ARE YOU? .....

POSTAL ADDRESS: .....

TELEPHONE NUMBER: .....

SCHOOL TELEPHONE NUMBER: .....

TEACHER/PARENT'S SIGNATURE FOR CONSENT: .....

GET YOUR ENTRY TO US BY 12 NOVEMBER 2018
IN ONE OF THE FOLLOWING WAYS:

Mail it to: NAME THE SATELLITE COMPETITION, c/o SAASTA, PO BOX 1758, PRETORIA 0001
Hand deliver to: SAASTA, DIDACTA BUILDING, 211 SKINNER STREET, PRETORIA
Email to: zacube@saasta.ac.za
Fax to: 086 460 9860

COMPETITION RULES

- Send in one name per entry form only.
- You may make photocopies of the entry form, or download copies from the website www.saasta.ac.za.
- Your entry must reach us by 12 November 2018.
- The organisers will appoint independent judges and their decision will be final.
- The name becomes the property of the Department of Science & Technology and NRF|SAASTA.
- For enquiries, contact Jacky Tshokwe, Telephone (012) 391-9326.
- For more information visit www.cput.ac.za/fsati.

science & technology
Department: Science and Technology
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation | SAASTA South African Agency for Science and Technology Advancement

sansa SOUTH AFRICAN NATIONAL SPACE AGENCY

Cape Peninsula University of Technology

The Mahikeng Astronomy Telescope

A picture of the Mahikeng Astronomy Telescope at the North-West University. *Source: North-West University*

RIP HHP

One more Mahikeng STAR in the sky...

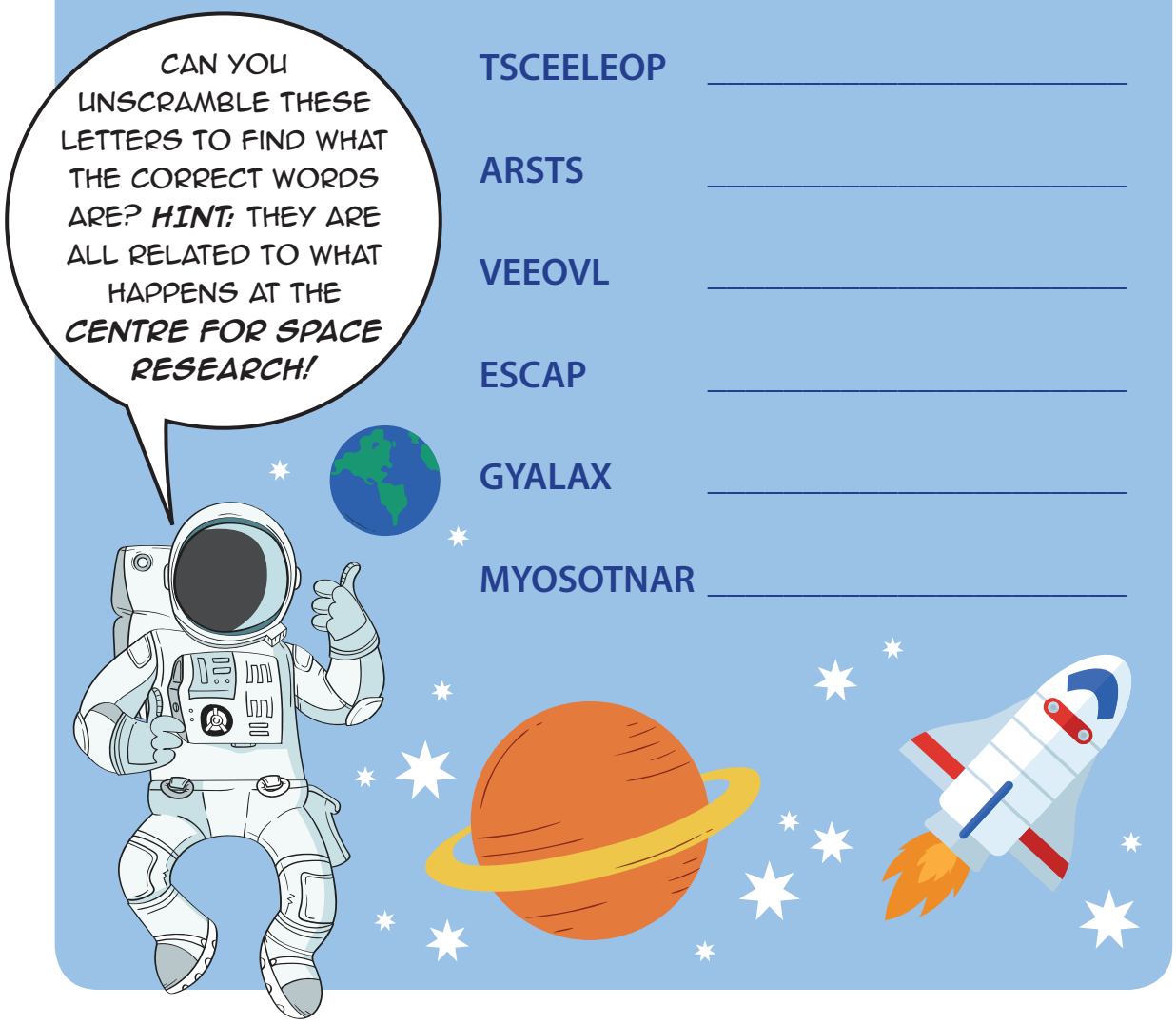
Spaza Space would like to pay tribute to Mahikeng's very own star, Hip Hop Pantsula who is also known as HHP. He was a source of pride to the people of his hometown, Mahikeng. His contribution to South African music will not be forgotten.

The Mahikeng Astronomy Telescope will allow scientists to study the changes in the brightness of stars and study the inside of stars to show them how the stars evolve.

The telescope is based at the North-West University and was co-funded by the South African Department of Science and Technology. The programme is led by Professor Thebe Medupe who started astronomy at this university in 2010. The telescope can be operated remotely, which means that learners like you (yes, you reading this newspaper) can access it from anywhere in the country using the internet. To access the telescope, you need to register with the University and ask them for permission. The Centre for Space Research also hosts schools at the observatory as part of their outreach programme. If you are interested in visiting the telescope or using it remotely, ask your teacher or parent to give the University a call on (018) 389 2374 / 2606.

Check out the fun activity worksheets about this telescope in this edition of* Spaza Space*!

WORD SCRAMBLE

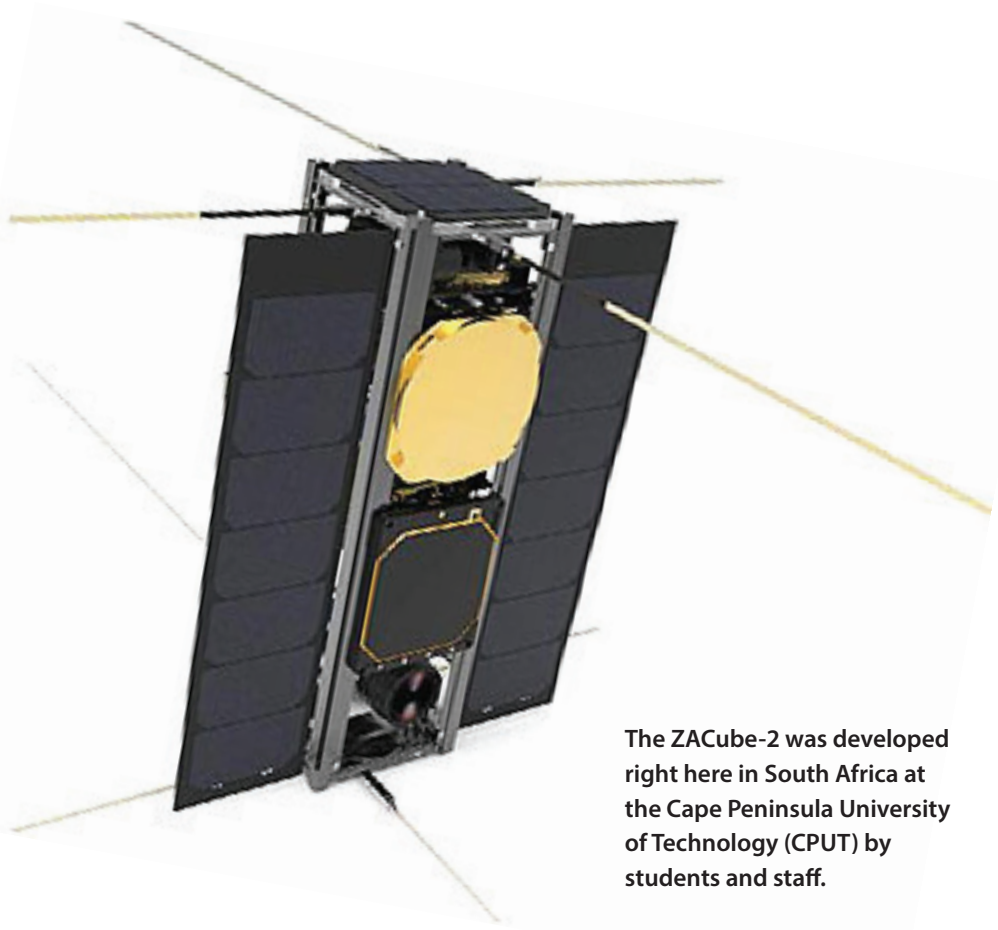


science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

These innovations in astronomy and space science are supported by the ***Department of Science and Technology***
www.dst.gov.za

The ZACube-2
Tiny but mighty

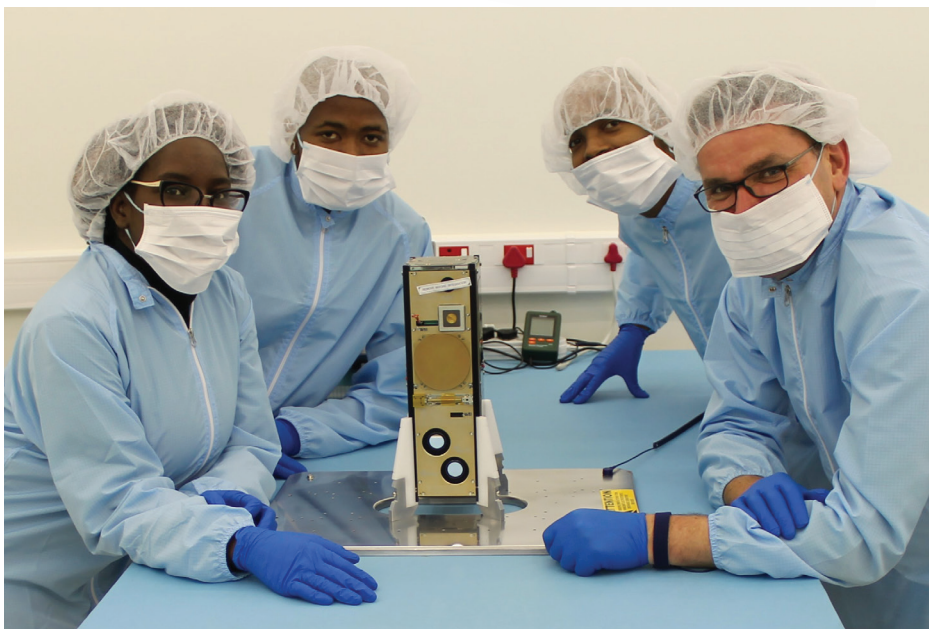
The ZACube-2 satellite follows the ZACube-1, which was used for space weather research. The ZACube-2 will be used to track boat activity along the coast of South Africa and detect forest fires. It will receive signals from the ships' Automatic Identification Systems, which will enable authorities to track the position of local and foreign vessels in SA's coastal waters.



The ZACube-2 was developed right here in South Africa at the Cape Peninsula University of Technology (CPUT) by students and staff.

The nanosatellite only weighs four kilograms and has been developed by the Cape Peninsula University of Technology in collaboration with the French South African Institute of Technology and is the second nanosatellite to be developed at the University. The satellite was sent off to India on 17th April 2018, so that it could be launched. The satellite forms part of an expected satellite constellation which South Africa aims to complete within the next four years. The project's missions are to contribute to the development and transformation of the national space industry, and to serve as a way to start national and international collaborations between South Africa and other countries. In an attempt to develop human capital and skills, the programme involved 18 engineers and technicians, and produced 59 Master's graduates and four PhD graduates.

Check out the fun activity worksheets about this telescope in this edition of the* Spaza Space*!



PUZZLE YOUR MIND!!

Can you find the words below in the grid? The words can be diagonal, horizontal or vertical.

AFRICA
ASTRONOMY
CONSTELLATION
EARTH
NANOTECHNOLOGY
NAVIGATION
ORBIT
SATELLITE
SOUTH
SPACE
ZACUBE

O	I	L	G	A	A	J	T	D	H	N	C	H	Y	L	T	S	P	L	H
S	U	G	U	O	M	R	I	B	A	E	A	G	N	H	A	Q	I	Q	Z
U	S	E	Q	J	X	F	V	C	A	W	O	V	C	I	K	S	I	L	Y
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A	C	I	R	F	A	P	T	R	O	U	Z	Q	J	G	O	L	F	Y	Z
T	X	X	W	N	O	R	N	N	S	J	J	I	Q	Q	A	L	M	K	B
E	I	N	G	O	O	T	H	V	L	L	H	X	S	R	A	T	V	Q	W
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L	N	P	O	B	E	L	N	Q	N	X	R	S	Y	A	L	G	B	O	T
I	G	M	R	T	Z	A	L	X	B	F	E	D	H	A	K	H	T	S	N
T	Y	O	O	W	O	E	R	Z	S	J	E	B	T	A	S	J	O	C	I
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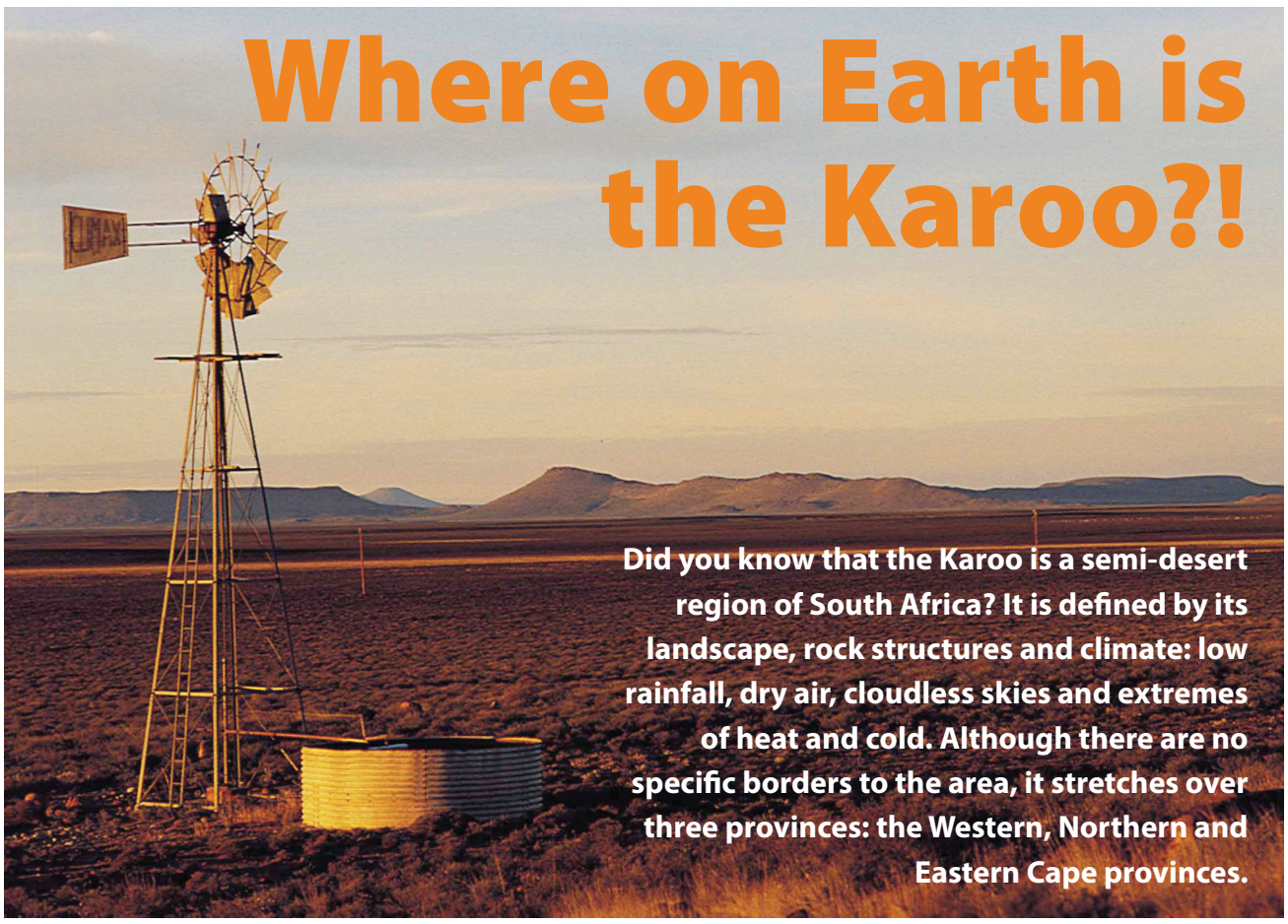
L	A	H	L	T	R	U	J	X	H	Q	V	S	O	C	U	O	M	V	N
N	C	D	J	W	A	H	M	C	C	C	S	G	S	Z	A	M	X	F	D
M	Z	W	L	X	Z	M	B	X	Q	W	I	B	O	B	L	Z	W	Z	B
E	M	T	Y	C	I	W	B	Q	F	U	V	F	L	T	E	L	G	A	J
A	Y	Y	D	Q	T	R	P	E	K	C	F	C	V	S	E	F	U	B	P
Q	H	H	X	A	V	B	Z	X	Z	L	J	L	N	K	X	N	H	J	I
S	V	Y	M	W	T	C	H	V	Y	M	R	J	L	Y	W	J	Y	J	Y
F	L	W	N	Q	E	Z	S	P	A	C	E	T	P	O	G	S	L	W	E

Where on Earth is the Karoo?!



Did you know that the Karoo is a semi-desert region of South Africa? It is defined by its landscape, rock structures and climate: low rainfall, dry air, cloudless skies and extremes of heat and cold. Although there are no specific borders to the area, it stretches over three provinces: the Western, Northern and Eastern Cape provinces.

A map of South Africa indicating the Great Karoo region.
Source: Wikicommons by Oggmus - CC BY-SA 3.0. https://commons.wikimedia.org/w/index.php?curid=33539488

The Karoo is very old and has a long story. Almost 400 million years ago, Africa was part of the old continent called Gondwana or Gondwanaland! It connected Africa to the continents we know today as South America, Asia and Australia. However, over time Gondwana slowly drifted northwards until Africa split off from the rest of the landmass!

Although much of the southern part of Africa was originally covered in ice sheets, the climate warmed up. The icebergs and waters that covered the Karoo slowly dried out until it became the dry area we know today.

We can still see the results of that long history! The Karoo contains many fossils, proving that millions of years ago, it sustained many more forms of animal and plant life than it does now. The Karoo is divided into the Great Karoo and the Little Karoo by the Swartberg Mountain Range.

Filling in the gaps

South African scientists have discovered more than a dozen new species in the Karoo

The Karoo has always been an area that has not been studied enough in the past, because of its high temperatures, huge distances and mostly privately owned land. However, this area has been recognised as an area that is important for future developments, therefore studies needed to be done to learn more about this area so that decisions could be made about future developments.

Many people were under the impression that the Karoo has an ecosystem that does not have a variety of species. Boy were we all surprised to discover these new species!

The Karoo BioGaps project took three years to fill in biodiversity information gaps. New species that were found in this study include:

- Two new scorpion species
- A plant – an undescribed cat's tail (Bulbine genus) in the Aloe family
- Numerous new species of trapdoor spiders have been found in the families Nemesiidae and Ctenzidae (genus Stasimopus) and two new species of ground wandering spiders in the genus Megamyrmaekion.
- While work is still underway, we strongly suspect that three new ground nematodes (roundworms) have been discovered (important indicators of soil health).
- Two new species of endemic cyprinid minnows (freshwater fish), one in the genus Pseudobarbus and another one in the recently erected genus Amatolacypris
- At least one new Fusarium species (a large genus of filamentous fungi important for soil health)
- Potentially several new grasshopper species
- A new reptile species has been confirmed and will be described.

Species that were updated:

- Two lizards: Cordylus cloetei and Pseudocordylus microlepidotus
- Several snake species
- The revision of the Euryphymus genus of agile grasshoppers
- Taxonomic revision of two stream fishes

You too can help the Karoo BioGaps Project!

The public can get involved in this exciting Karoo BioGaps Project by transcribing data from museum and herbaria collections using the online platform **http://transcribe.sanbi.org/.**

From top to bottom: **A picture of a lizard species: *Pseudocordylus microlepidotus Namaquensis;* a plant, which is being described as a cat's tail found in the Aloe family; new species of ground wandering spiders in the genus Megamyrmaekion.**

The MeerKAT International GHz Tiered Extragalactic Exploration (MIGHTEE)

Galaxies are vast collections of stars, gases and planets. MIGHTEE is asking questions about how they are formed.

Source: IDIA

A picture of our neighbouring galaxy, Andromeda. *Source: NASA/JPL-Caltech*

Galaxies can contain several hundred billion stars each. Those stars and everything else that makes up a galaxy are held together by gravity. Each galaxy forms a giant island of "stuff" in the much emptier intergalactic space around it.

Astronomers have studied galaxies for a long time, but there are still many things we don't know about them, which telescopes like the MeerKAT will help us to understand.

How are galaxies born, and how do they evolve? How do the stars form at different times in the evolution of the galaxy when the galactic environment changes? Looking at galaxies very far away, the MIGHTEE project will study how galaxies formed and evolved over the history of the universe.

For example, many galaxies have an active centre. An active centre is the name astronomers give galaxies that have a super-massive black hole at their centre. Because of the black hole's gravitational pull, the black hole consumes the galaxy – gas and stars fall into the black hole. This creates radiation, another word for light, that can shine brighter than the billions of stars of the entire galaxy itself, and that MIGHTEE will observe and analyse.

One of the biggest mysteries in the universe is how magnetic fields emerge within galaxies and, on a cosmic scale, between galaxies. Magnetic fields are everywhere. Earth's own magnetic field is what is used to tell the north-south direction using a compass. The MIGHTEE project will also use MeerKAT to see the magnetic fields found in and between galaxies.

The Science Spaza National Science Week event

In order to create a love for science, it is important to reflect on the importance of science education, especially at high school level. National Science Week 2018 began on 30 July 2018 and ended on 4 August 2018.

The Science Spaza Team hosted an event at Edendale Technical High School during National Science Week. The event aimed to light a passion for science in the hearts of high school students and to emphasize that science is for EVERYONE, not only the select few!

Two students who are currently completing their second year of their Master's degrees at the University of KwaZulu-Natal spoke to the learners about mathematics, statistics and probability, as well as about environmental science. Learners were eager to ask questions and get involved – and oh, get involved they did!

Students from the school were also keen to ask thought-provoking questions, especially regarding the lunar eclipse that South Africans saw in July this year. They were encouraged to start their own science club so that they can receive scientific information all year round. The event ended off with an impressive talk about physics by Dr. Couling, who is a physics lecturer at the University of KwaZulu-Natal. The enthusiasm of the teachers, learners and speakers contributed to the event being a massive success!

Dr. Vincent Couling explaining physics to learners at Edendale Technical High School.

Learners from Edendale Technical High School with their copies of *Spaza Space*.

Banele Mdakane is a researcher in mathematics and Statistics at the University of KwaZulu-Natal.

NEWS FROM THE CLUBS

This is where you, the members of the Science Spaza clubs, get to share your news and have your say about science issues.

Above and right: **Learners from Northern Park High School doing fun science activities.**

Northern Park High School's science club has been super busy with fun scientific activities! Over the past few weeks they built a super spinner, also known as an anemometer (a device used to measure the speed of wind). They made ooey gooey slime using borax and office glue, as well as a cool lava lamp using oil and coloured water. They have also demonstrated the chemical effects of bleach on coloured substances. Well done to this science club for taking such initiative with cool projects!

Above and below: **Learners from Northriding High School participating in National Science Week activities.**

The Northriding High School's science club outdid themselves for National Science Week (NSW) 2018! They hosted an entire week of science activities at their school. Here is a write-up of activities from Philothea Fundisi, one of their grade 10 students:

On 31 July 2018, we as NRHS science club split up into committees and hosted a power-packed National Science Week Fest. Can I just say WOW, it was AMAzing. From the colourful decor, delectable finger foods, mesmerizing experiments, and fun science quiz, to our two MCs who were so eloquent in speech, our spot-on NSW tees as gear and a media crew to capture all the beautiful moments. A poem by Amanda Phakati and speech by yours truly soothed the hearts of the floor at large. The presence of our guest speaker, Doctor Oosthuizen, graced our event with a lecture. We really understand science from a much more fun perspective. Kudos to NRHS science club for hosting a Grand Fest.

Above: **The awesome kids from BOOMSciKids Science Club hosted a science expo on 17 August 2018! Our collage shows some of their activities.**

Explorers Science Club participated in the Eskom Science Expo that took place at the University of Fort Hare. Three students received gold medals for their projects and one student received a silver medal. Congratulations to all of them!

A gold medal winner *(left)* **and silver medal winner** *(right)* **at the Eskom Science Expo.**

Start your own Science Spaza

Do you want to start a science club at your school? Send us the following information, and Science Spaza will contact you.

School: _____

Name: _____

Telephone number: _____

E-mail address: _____

Postal address: _____

_____

_____

_____

Visit www.sciencespaza.org, email info@sciencespaza.org, sms or WhatsApp us on 076 173 7130 or write to us at PO Box 22106, Mayor's Walk, 3208.

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